Boren

Boren Overview

Volunteer monitoring began at Lake Boren in the 1980s, then continued in1994, and 1997 through 2004. Collected data identify this lake in the city of Newcastle as moderate in primary productivity (mesotrophic) with good water quality.

Lake Boren has a car top boat launch area in the park. Eurasian milfoil has been found in the near-shore environment, and residents should watch the lake for the spread of this species or early infestations of Brazilian elodea and other noxious aquatic weeds.

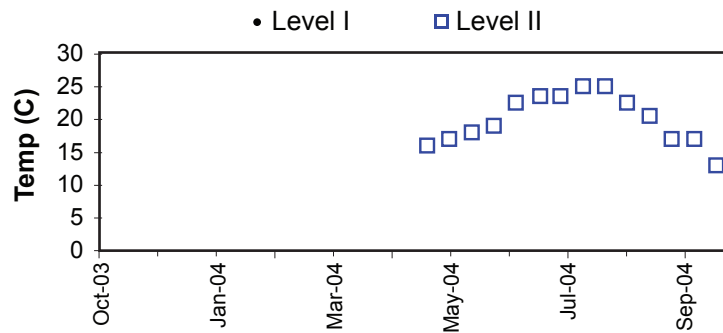## Lake Temp, Secchi Depth, Lake Level and Precip

Secchi transparency ranged between 1.1 and 9.2 m during the Level II sampling season, which was the largest difference recorded for all the lakes monitored in 2004. The average of 4.4 m placed it in the upper range of all measured lakes. Level II surface water temperatures placed in the mid range for small lakes, reaching a maximum of 25.0 degrees Celsius.

Excellent precipitation and water level records were available, showing that the lake level is fairly stable through the year, with short-lived peaks that correspond to rainfall events.

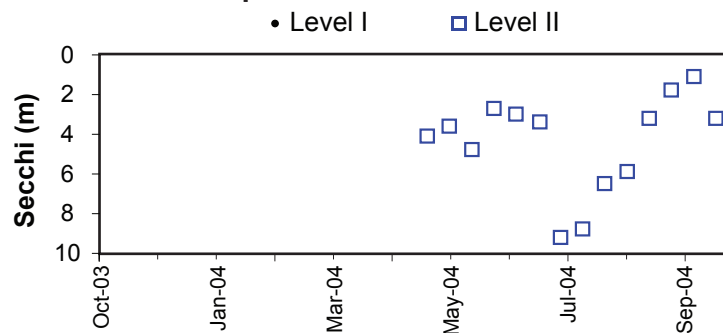## Nutrient Analysis and TSI Ratings

Total nitrogen decreased while total phosphorus remained constant for the early part of the season, with a sharp increase in early June. The N:P ratio ranged from 18 to 52, averaging 27, with many dates below 20 which suggests good conditions for nuisance bluegreen growth.
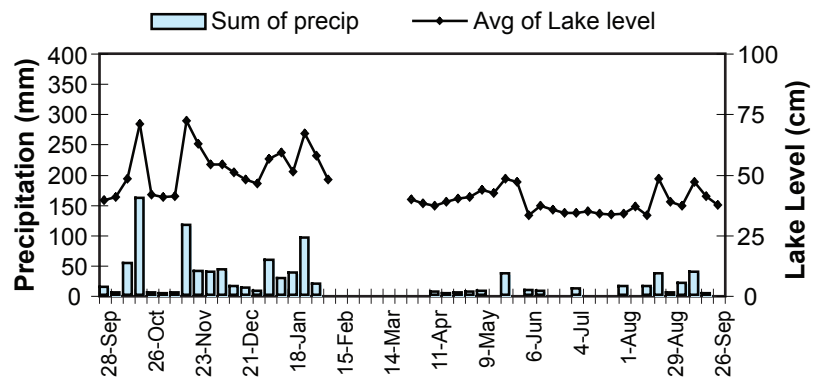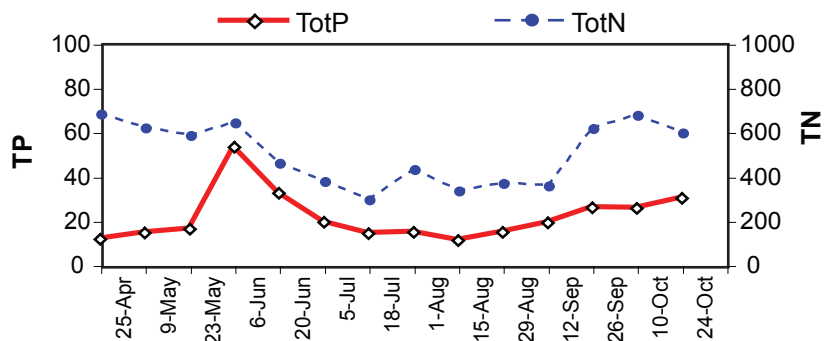
Lake Temperature

Secchi Depth

Lake Level and Precipitation

Nutrient Analysis

Profile data indicate that thermal stratification was present, but probably not strongly maintained. There was little phosphorus build-up in the deep water through the summer. Chlorophyll data indicated that algae were approximately equal in concentration through the upper water on both dates.

TSI values for 2004 were similar to the previous five years, with the indicators fairly close to each other in the mesotrophic range. The TSI-Secchi was lower than the other two indicators, more similar to 1994 and 1997.

Chlorophyll Concentrations and Algae

Chlorophyll content at 1m rose in late May through June, dropped to a summer low and then rose to a major peak in late September. The September peak was made by the bluegreen *Aphanizomenon flos-aquae,* which dominated the fall bloom. Other common algae included the chrysophyte *Dinobryon*, the colonial bluegreen *Anacystis*, several species of colonial chlorophytes, and the cryptophyte *Rhodomonas*.

Date	Secchi	depth-m	degC	Chlor-A	TP μg/L	TN μg/L
5/23/04	4.8	1	18.0	6.73	16.1	590
		5	16.5	7.05	18.6	605
		9	12.0		21.7	719
8/29/04	5.9	1	22.5	4.30	14.7	372
		5	20.0	6.40	16.9	416
		9	19.0		23.9	419

TSI Ratings

Chlorophyll a Concentrations (ug/L)
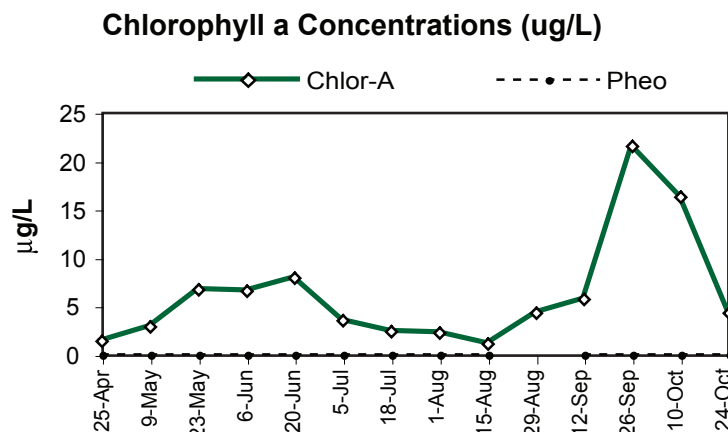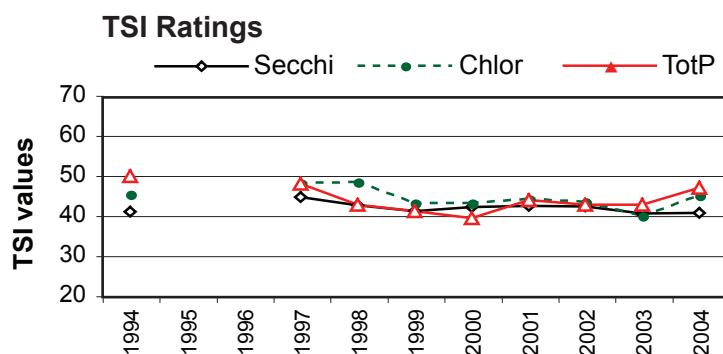
Common Algae

	Group
Aphanizomenon flos-aquae	Cyanobacteria
Dinobryon divergens	Chrysophyta
Anacystis sp.	Cyanobacteria

Boren

2004 Level I Data

Daily Data Summary

Week of	Sum of precip. (mm)	# of days	Avg of lake level (cm)	# of days
28-Sep-03	13	5	39.4	5
5-Oct-03	16	7	40.9	7
12-Oct-03	40	7	48.1	7
19-Oct-03	160	7	70.1	7
26-Oct-03	4	7	40.9	7
2-Nov-03	2	7	40.1	7
9-Nov-03	17	7	41.6	7
16-Nov-03	117	7	72.9	7
23-Nov-03	26	7	62.9	7
30-Nov-03	43	7	53.7	7
7-Dec-03	39	7	53.7	7
14-Dec-03	15	7	49.4	7
21-Dec-03	10	7	47.0	7
28-Dec-03	6	7	45.7	7
4-Jan-04	58	7	58.4	7
11-Jan-04	33	7	57.7	7
18-Jan-04	43	7	51.7	7
25-Jan-04	86	7	67.3	7
1-Feb-04	17	7	55.3	7
8-Feb-04	0	5	47.0	5
15-Feb-04				
22-Feb-04				
29-Feb-04				
7-Mar-04				
14-Mar-04				
21-Mar-04				
28-Mar-04	0	4	39.3	4
4-Apr-04	0	7	37.6	7
11-Apr-04	5	7	36.7	7
18-Apr-04	2	7	38.6	7
25-Apr-04	4	7	39.9	7
2-May-04	5	7	40.6	7
9-May-04	7	7	43.1	7
16-May-04	0	7	42.0	7
23-May-04	35	7	49.0	7
30-May-04	0	7	44.6	7
6-Jun-04	12	7	32.7	7
13-Jun-04	2	7	36.3	7
20-Jun-04	0	7	34.9	7
27-Jun-04	0	7	33.6	7
4-Jul-04	10	7	34.0	7
11-Jul-04	0	7	34.3	7
18-Jul-04	0	7	33.3	7
25-Jul-04	0	7	32.9	7
1-Aug-04	14	7	34.3	7
8-Aug-04	0	7	35.3	7
15-Aug-04	27	7	34.7	7
22-Aug-04	22	7	47.4	7
29-Aug-04	4	7	37.4	7
5-Sep-04	24	7	38.1	7
12-Sep-04	34	7	46.6	7
19-Sep-04	3	7	39.3	7
26-Sep-04	0	4	37.0	4
Min	0.0		32.7	
Max	160.0		72.9	
Total	955.0			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	Algae* (Shore)	Algae* (at site)	Goose Count*
Min		0.0	0.0			
Max		0.0	0.0			

* See introduction for discussion of algae assessment and goose count methods.

2004 Level II Data

Date (2004)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP
25-Apr	16.0	4.1	1.40	11.8	687	1	58	39.6	33.9	39.8
9-May	17.0	3.6	2.88	14.6	623		43	41.5	40.9	42.8
23-May	18.0	4.8	6.73	16.1	590	2	37	37.4	49.3	44.2
6-Jun	19.0	2.7	6.57	53.4	647		12	45.7	49.0	61.5
20-Jun	22.5	3.0	7.93	32.4	466	2	14	44.1	50.9	54.3
5-Jul	23.5	3.4	3.52	19.5	381	2	20	42.3	42.9	47.0
18-Jul	23.5	9.2	2.40	14.2	299	1	21	28.0	39.2	42.4
1-Aug	25.0	8.8	2.24	14.9	437		29	28.6	38.5	43.1
15-Aug	25.0	6.5	1.10	11.1	338		30	33.0	31.5	38.9
29-Aug	22.5	5.9	4.30	14.7	372		25	34.4	44.9	42.9
12-Sep	20.5	3.2	5.77	19.0	362	1	19	43.2	47.8	46.6
26-Sep	17.0	1.8	21.50	25.8	621	2	24	19.1	60.7	51.0
10-Oct	17.0	1.1	16.30	25.7	680		26	19.1	58.0	51.0
24-Oct	13.0	3.2	4.33	30.2	601	1	20	23.0	44.9	53.3

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP
Mean	20.0	4.4	6.2	21.7	507.4	1.5	27	34.2	45.2	47.1
Median	19.8	3.5	4.3	17.6	527.8	2	25	35.9	44.9	45.4
Min	13.0	1.1	1.1	11.1	299.0	1	12	19.1	31.5	38.9
Max	25.0	9.2	21.5	53.4	687.0	2	58	45.7	60.7	61.5
Count	14	14	14	14	14	8	14	14	14	14

TSI Average = 42.2